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MARKET NEED ANALYSIS FOR THE HCR-MANORCARE LAKEWOOD, COLORADO PROJECT

By

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INTRODUCTION

I have been engaged by HCR ManorCare ("ManorCare") to determine whether its application for 60 new Medicaid certified beds (the "MCHA-Lakewood project") meets individually, or collectively, several of the criteria set forth in the Department of Health Care Policy and Financing's ("HCPF") regulations pertaining to such applications. From a health care policy planning perspective, I have assessed these various factors within this market need analysis in light of the results of my research.

This market need analysis will discuss the following: First, I will address the rationale and methodology for defining the Identified Service Area (the "ISA"), as set forth in the Service Area Description at Tab 4 of the application, as required by HCPF's regulation at § 8.430.3.A.2.b.iii. Second, in support of HCR ManorCare's presentation in this application that the MCHS-Lakewood project constitutes a new model of care (*See* the Model of Care at Tab 13) my analysis similarly shows that the proposal's projected use of the Medicaid certified beds is differentiated from existing facilities that have Medicaid certified beds in the ISA; thus, the project meets this criterion for HCPF approval of its application under § 8.430.3.A.5.b. Third, the MCHS-Lakewood project additionally meets the regulation's underserved geographic area definition found at § 8.430.5.j.i and accordingly, the proposed project also complies with HCPF's regulatory requirement for provision of beds to an underserved geographic area.

As a preliminary matter, I note that the regulation pertaining to HCPF's approval of an application for certification of new Medicaid beds, § 8.430.3.A.5, states simply that "approval or denial…shall be based on the following information from the applicant." Based on this language, it can be readily inferred that new facility bed certification can be achieved by showing that any one of the separate criterion is met, as opposed to collectively meeting all of the

[1] See Exhibit E for Bruce Neumann, PhD, resume.

enumerated criteria. Additionally, the regulatory language contained in § 8.430.3.A.5.j also makes clear that the "need" for new Medicaid certified facility beds, is but only one criterion upon which HCPF may rely to approve an application for certification of new Medicaid certified beds. In other words, approval for new Medicaid certified beds is not premised solely on meeting the statistical formula that there is an underserved geographical area or special population that requires new beds. Any interpretation of these criteria by HCPF must be consistent with the regulation's obvious goal that Medicaid residents are entitled to benefit from other health care modalities such as new models of care or special programs for targeted populations that incorporate the use of new, specialized, and enhanced advancements in the post-acute health care environment such as that proposed by the MCHS-Lakewood project. Furthermore, any contrary view would be antithetical to one of the fundamental tenets of the Medicaid Program under Title XIX of the Social Security Act, which is that eligible recipients shall have access to care and services that are available to the general population in that same geographic area. *See* 42 U.S.C. § 1396a(a)(30)(A). Accordingly, ManorCare's application for 60 new Medicaid certified beds cannot be practically or legally limited to a cursory determination of whether it meets a statistical test based upon an arbitrary "need formula" that only includes a few over-simplified population and census components.

ANALYSIS

I. Identified Service Area Designation

A. Introduction

Generally, service areas have been used to make decisions relating to marketing, regulations, and business. They are most useful when they are custom-designed to meet an organization's needs and market. The marketing arena first recognized the importance of service areas and defined a service area as "...first the product of interest and second, the geographic market in which trade in the product occurs."[2] Because we know that the product, or service, applicable to defining this service area is for specialized post-acute facility services to Medicaid beneficiaries, it is important to define the proper geographic market.

The health care industry has also recognized the importance of using service areas to properly assess use of, and access to, particular health care services within a "health service area."[3] In health care, with respect to hospital services, "...a health service area is one or more

[2] Morrissey, Michael, Sloan, Frank A., and Valvona, Joseph, " Defining Geographic Markets for Hospital Care," *Law and Contemporary Problems*, Vol. 51, No. 2, Spring, 1988, pp. 165-194, at 166.

[3] Makuc, Diane M., et. al., "Health Service Areas in the United States," *Vital and Health Statistics: Series 2, Data Evaluation and Methods Research.* 1991 Nov; (112):1-102.

counties that are relatively self-contained with respect to their provision of routine hospital care."[4] One of the critical factors in defining a health service area within a metropolitan area relates to finding a self-contained area, whether it is defined by counties or otherwise. To address this issue, some health service area experts have defined service areas based on factors such as geopolitical boundaries, physical distance to a health care provider, patient-origin, and price analysis, including "...ZIP code, census tract, town, county, metropolitan statistical area (MSA), or other geographic area." (emphasis added).[5]

Health care service experts have also used the concept of a 'health care commuting area' as a primary definition of service area, which recognizes the role that transportation and commuting distances generally play in access to health services. Because transport and accessibility play such a crucial role in defining a service area, often natural geographic barriers or publicly constructed barriers will be used to define the geographic area of the service area. For example, mountains, rivers, or other natural barriers can restrict access within service areas. Similarly, publicly constructed barriers such as canals, rail, freeways, and toll-ways can also restrict access. Thus, I have used these notions of transport and accessibility in my assessment of the ISA definition.

As I will further discuss, this designated ISA incorporates portions of three different counties, which creates a more self-contained and homogenous ISA than if the ISA had been defined by county lines in their entirety. By using the freeway system as the boundaries of the ISA, the MCHS-Lakewood project strives to create a more self-contained ISA. As I additionally note, when a service area is bounded by publicly constructed barriers, it can, and should, be more homogeneous than cities or counties in their entirety. For example, Jefferson County is sparsely populated in most of its mountainous regions and it would not be appropriate to define a nursing facility service area by including mostly mountain districts because the ratios of population to land mass would not be comparable to more typical metropolitan areas. This ISA, therefore, is more homogeneous from a health planning standpoint than a service area comprising all of Jefferson County contained within its county lines.

This designated ISA further incorporates certain portions of Denver and Arapahoe Counties as part of the area that the MCHS-Lakewood project intends to serve. For example, while the main components of Denver and Arapahoe Counties include the central business districts of Denver and Aurora, these are not areas that the MCHS-Lakewood project intends to serve. Consequently, no single county in the metropolitan area can provide a homogeneous geopolitical unit that is useful for evaluating the need for 60 additional post-acute certified Medicaid beds.

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[4] Makuc, et. al. at 1.
[5] *Id.*

As to population issues, there are many industrial and military complexes scattered throughout the metropolitan area. The designated ISA minimizes inclusions of such activities. The population is relatively homogenous within this area and therefore is not biased by the presence of intense concentrations of commercial, industrial, or military activities.

Thus, neighborhoods and proximity are often the dominant factor when choosing a health care facility to provide the post-acute services proposed by this application. "Historically, consumer choice of a nursing facility has been based on the proximity of the facility to an individual's home or the home of relatives and friends....evidence suggests that location will become the overriding criteria..."[6] The ISA designated for this project represents a neighborhood identity (mostly within Jefferson County) that has easy access to the proposed site.

B. Geographic Definition

The designated service area for the MCHS-Lakewood project's ISA is an area bounded by 6th Avenue on the North, I-70 on the North West tip, C-470 on the West and South as it intersects with Santa Fe Drive (Highway 85) on the East, and I-25 on the North East. This network of freeway barriers, which surrounds a group of neighborhoods with distinct identity, offers convenient travel and neighborhood identity and proximity within its boundaries. Travel within this ISA is convenient and rapid, either by using surface streets or the freeways. People shop and go to schools, churches, and other community activities in these neighborhoods. They are very likely to seek health care within these boundaries. The proposed site for the MCHS-Lakewood project is 8080 Jewell Avenue, Lakewood, CO, which is almost at the geographic and population center of the ISA.

II. Geographic Underserved Area

A. Introduction

Pursuant to HCPF's regulation at § 8.430.3.5.j.i, the designated ISA also qualifies as an underserved geographical area of the state. In order to qualify as an underserved geographical area under this regulation, the proposed service area must demonstrate the following: (a) the service area must be "no more than two contiguous counties in the state;" (b) the service area must have a nursing facility bed to population ratio of less than 40 beds per 1,000 persons over the age of 75 years; and (c) within the proposed service area, the existing nursing facilities must

[6] Mehta, Aditi, "Spatial Competition and Market Definition in the Nursing facility Industry," *iHEA 2007 6th World Congress: Explorations in Health Economics*, https://secureweb.mcgill.ca/economics/sites/mcgill.ca.economics/files/mehtapaper.pdf (Mehta, pp. 2-3)

have an occupancy rate of over 90% for the six months preceding the filing date of the application. As we will discuss below, the designated ISA meets all three of these requirements.

As a preliminary matter, for this project, I used the Pitney Bowes AnySite software to custom design the designated ISA. As one of the leading developers of predictive analytics for over 40 years, Pitney Bowes has developed the AnySite software, which is a powerful mapping and reporting application capable of processing complex data and conducting related analyses, that allows one to select a customized geographic area and then to evaluate and apply a wide variety of population demographics to that customized geographic area. The AnySite software provides demographic information that describes the U.S. population in terms of count and character and relies upon data from the Census 2010 data, the American Community Survey data, updated estimates and projections, and comparable Census 2000 data. Because of the rich choices of data and the flexibility of the software, the AnySite software allows for more accurate population estimates.

Because the Medicaid certification for new beds regulation refers to population statistics issued by the Colorado Department of Local Affairs (the "CDLA"), I have compared the CDLA population data to that of the AnySite software for the age groups 65+ and 75+ for each of the three counties within the ISA (Jefferson, Arapahoe, and Denver counties) and the state as a whole for the years 2012, 2013, 2017, and 2018 (the "Identified Years"). *See* Exhibits A and B. Generally, with only a few exceptions, the Pitney Bowes data was more conservative in its population statistics. In other words, generally, the Pitney Bowes population number was less than the population number given by the CDLA. As shown in Exhibits A and B under the "Difference Factor" column, I additionally identified the difference between the population number given by the CDLA and Pitney Bowes data for each county and age group, and state and age group, for the Identified Years. By comparing the population of CDLA and Pitney Bowes for the Identified Years, I was able to verify the validity of the Pitney Bowes data and to confirm that any differences with the CDLA data for the purposes of this analysis were not material.

By using the Pitney Bowes software, I was able to not only create a customized ISA, but I was able to obtain the demographic information for that customized area for the base years and the projection years, cumulatively, the Identified Years. In other words, by using the Pitney Bowes data, I was able to obtain the applicable population for the ISA, which is comprised of portions of Jefferson, Denver, and Arapahoe counties. However, because the CDLA data only reports population for counties as a whole, or the state as a whole, I needed to account for the difference between these two data sets. Therefore, I averaged together all the numbers in the Difference Factor column to obtain a weighted average. I then used this weighted average as a scaling factor to apply to the Pitney Bowes data (the "Increase Factor"). I determined that the Increase Factor for the 65+ population to be 1.15 and that for the 75+ population group to be 1.05. I am assured that applying this Increase Factor to the Pitney Bowes data will accurately

estimate the population if the CDLA data had been used. Thus, in creating and using the Increase Factor, I was able to estimate what the CDLA population estimates would have been for the three county segments in the ISA if the CDLA data had the same flexibility as the Pitney Bowes data.

Accordingly, we are assured that in using the Pitney Bowes software to customize the designated ISA, and subsequently to apply demographic information, we are using a more accurate and conservative approach that does not materially differ from the CDLA population information.

B. Two Contiguous Counties

Pursuant to HCPF's regulation at § 8.430.3.5.j.i.1, the service area must be "no more than two contiguous counties in the state." The regulation is ambiguous in terms of what it means by "two contiguous counties" with regard to whether it refers to a county in its entirety and to whether it means the geographic area or population of those counties. Because of the lack of clarity provided by the regulation, we can only presume that the regulation refers to a county in its entirety. Thus, regardless of whether the regulation refers to geographic area or population, the MCHS project's designated ISA does not exceed (1) the geographic area of more than two entire counties; or (2) the total population of more than two entire counties. We believe this approach is consistent with generally accepted health care planning principles.

Geographically, the MCHS-Lakewood project's designated ISA is quite small. At 96.28 square miles, and with a maximum distance of 12 miles between the North and South boundaries and 10.5 miles between the Eastern to Western boundaries, the ISA is comprised of portions of Jefferson, Arapahoe, and Denver counties. While Jefferson County is the largest component of the ISA, (it is 66.7% of the ISA's total square mileage), the portion of Jefferson County contained within the ISA is roughly 8.3% of Jefferson County's total square mileage. Similarly, the portions of Arapahoe and Denver Counties contained within the ISA are small in comparison to the total square mileage of each county, 1.4% of Arapahoe and 13.4% of Denver Counties. In fact, the total square mileage of the ISA, at 96.28 square miles, is less than that of any one of the counties that comprise it (Jefferson County is 773 square miles, Arapahoe County is 805 square miles, and Denver County is 155 square miles). Accordingly, since the total geographic area of the ISA is less than any one of the counties that comprise it, the ISA undoubtedly meets the HCPF regulation's requirement that the service area, if in relation to geographic area, be smaller than the aggregate of two entire counties. As noted above, we consider this interpretation of the regulation to be consistent with health care planning principles.

Similarly, the population contained within the ISA does not exceed that for any two of the three counties. For the ISA, the total population for 2012 is 358,666, which is less than the

total population in any single county in the Denver metropolitan area. In fact, the ISA's total population represents 38.8% of the total population in Jefferson County, 4.6% of the total population in Arapahoe County and 19.5% of population in Denver County. Thus, because the total population of the ISA is less than any one single county in the Denver metropolitan area, the ISA meets the definition that the service area is no more than two contiguous counties in the state.

Accordingly, when considered from a health care planning perspective, the MCHS-Lakewood project's designated ISA meets the HCPF regulation's requirement that the service area not exceed two contiguous counties regardless of whether "county" refers to geographic area or a population standard.

C. Bed Need Formula

Pursuant to HCPF's regulation at § 8.430.3.5.j.i.2, the service area must have a nursing facility bed to population ratio of less than 40 beds per 1,000 persons over the age of 75 years. Because the regulation is ambiguous in terms of what type of beds (i.e., whether the beds must be in service, licensed, and Medicaid certified), I believe that, given the purpose of the regulation, the formula should relate to the actual inventory of licensed, in service, Medicaid certified beds since the overall purpose of these regulations implicitly requires that the formula relate to Medicaid beds available for use. Additionally, I show the bed need for both the 65+ and 75+ populations for reasons that I have also described in more depth below. Accordingly, based on my research and analysis of the MCHS-Lakewood project in light of the intended purpose of these regulations, I conclude that the proposal's request for 60 Medicaid certified beds does meet the bed need formula described in the regulation.

i. 65+ and 75+ Population.

In addition to providing the demographic analysis, and applying the bed need formula, to the 75+ population, I also do so for the 65+ population. No appropriate need analysis would be complete or accurate for health planning purposes if an assessment was limited to the 75+ population category. It is critical to include within this analysis the 65+ population category because a portion of that population already resides in the nursing facilities and, as this population ages over the next 10 years, it will become just as pertinent, if not more critical, to this analysis as the 75+ population group. Thus, for health planning purposes, it is widely accepted to use the population groups that will use nursing facility services over a period of time that takes into account the project's eventual completion and optimal use.

Additionally, based upon the Pitney Bowes population projections for the ISA, both population groups, 65+ and 75+, will increase significantly over a relatively short period of time.

See Exhibit C. For example, the 65+ population group will increase from 43,762 in 2013 to 52,478 in 2018, an increase of 19.92%. Similarly, the 75+ population group will increase from 19,213 in 2013 to 22,124 in 2018, an increase of 15.15%. Thus, to not include the 65+ population group for health planning purposes would result in a severely flawed analysis as it would not account for bed shortages as the 65+ population group ages over the span of time appropriate for this project.

ii. Medicaid Certified Beds in Service.

Any reasonable interpretation of the purpose of the regulations would, from either looking at the purpose of the regulation as a whole or from a health planning standpoint, also conclude that any properly applied bed need formula must ultimately consider the number of beds available to Medicaid patients. In order to avoid a misplaced application of these regulations, particularly in light of Title XIX access requirements, I note that in conducting the bed to population ratio calculations, one must ultimately have to consider Medicaid certified beds that are currently in service.

In order to discretely consider Medicaid certified beds, I have reviewed the past nine quarterly nursing facility census reports issued by HCPF for the facility beds located in the ISA. According to the HCPF data, there is a difference between the total licensed nursing facility beds and the total licensed beds in Medicaid certified nursing facilities. *See* Exhibit D. For example, the total number of licensed nursing facility beds in the ISA is 1,177 while the total number of licensed beds in Medicaid-certified facilities is 965. Thus, for the reasons stated above, given the purpose of the bed need formula, I have used 965 as the number of Medicaid beds in the ISA.

In addition to solely considering Medicaid certified beds, I have also necessarily factored in only those beds currently in service. In order to determine the number of beds currently in service, ManorCare conducted facility tours and telephone interviews with all of the nursing facilities within the ISA. Based on the reported results of these tours and telephone interviews, I have determined that many licensed nursing facility beds have been taken out of service by being converted into offices and other facility support services or by being modified from triple and quad occupancy rooms into single or double rooms. For example, Villa Manor Care Center in Lakewood has 240 licensed nursing facility beds. However, after the informal surveys were conducted, it is determined that Villa Manor Care Center only has 102 beds in service that would be available to Medicaid residents. *See* Exhibit D.

Moreover, based on these reports, I have also determined that the majority of existing nursing facilities within the ISA are located in older, outdated buildings, some of which date back to the 1950s, with the "newest" Medicaid certified beds being in a facility over 24 years old, and that many of these older nursing facilities were built and licensed in a time when

space/design concepts for this type of population and its needs were different. *See* Exhibit D. It is also important to note that the two newer facilities opened in 1999 and 2010 do not have any Medicaid certified beds. Accordingly, I found that there is a significant difference between the total number of licensed beds and beds currently in service. *See* Exhibit D. Additionally, nursing facilities have neither the incentive, nor are they required to update their licensed beds after converting or modifying their total number of licensed Medicaid beds. Thus, while the survey findings show that the number of beds in service Medicaid certified nursing facilities located within the ISA is 795, the number could very well be much lower. *See* Exhibit C.

In sum, as Exhibit C shows for the past year of 2013 (once the Increase Factor as described above has been applied to the Pitney Bowes data) that there is an additional need of 1,218 Medicaid certified beds for the 65+ population and 12 Medicaid certified beds for the 75+ population group. Considering the factors pertaining to the span of time required for completion of the project and through a start-up period until the facility reaches optimal capacity, these need numbers increase drastically during the years 2017 (1,491 for 65+ and 80 beds for 75+) and 2018 (1,619 for 65+ and 134 for 75+). Taking into account that there is likely even less beds in service as ManorCare's informal survey found, this need for additional Medicaid certified beds is likely much higher.

D. Occupancy Rate

Pursuant to the regulation at § 8.430.3.5.j.i.3, the existing nursing facilities that are located within the proposed service area must have an occupancy rate of over 90% for the six months preceding the filing date of the application. However, the occupancy rates issued by the Colorado Department of Public Health and Environment ("CDPHE") Census Bed Report are problematic for similar reasons as previously discussed. These CDPHE reports measure the occupancy rates for the total number of licensed beds, which include Medicare and private pay patients, and not just the number of Medicaid certified beds in service. Thus, it is virtually impossible to determine, with any degree of accuracy, the occupancy rates for those Medicaid beds that are actually in service. Presumably, because any reasonable interpretation of the regulation requires consideration of the number of beds actually available to Medicaid recipients, the occupancy rates should also reflect that criterion.

Notwithstanding the above, I note that the only newer nursing facility beds within the ISA are located at Azura of Lakewood ("Azura"). Azura has had an occupancy rate of 99%. *See* Exhibit D. Azura, opened in 2010, is the newest nursing facility with an 11 year age difference between it and the next newest facility opened in 1999. Azura, presumably with a similar model of care as to the MCHS-Lakewood Project, however, does not contain any Medicaid certified beds. Based on the foregoing analysis, I believe that there is a significant need for 60 Medicaid certified beds within the ISA. Because the MCHS-Lakewood project is the only newer facility

that is seeking Medicaid certified beds, the MCHS-Lakewood project will fulfill that need as well as meet access requirements under Title XIX. The demonstrated population growth in the ISA for age cohorts 65+ and 75+ demonstrates that the Medicaid certified beds are needed now and in the immediate future.

CONCLUSION

In this Market Need Analysis, I have primarily addressed the three major factors that should be properly considered in terms of HCPF's regulations. First, I have concluded that the application's rationale and methodology for defining the ISA, based predominantly on individuals' choice of neighborhoods and proximity when selecting a health care facility to provide post-acute services, is the most logical approach when applied to the primary areas it intends to serve. Additionally, because the ISA incorporates only portions of Jefferson, Denver, and Arapahoe Counties, it is more homogenous from a health planning standpoint than a service area that comprises counties in their entirety as dictated by county lines. Second, based on my review and analysis of the ISA, I conclude that the MCHS-Lakewood project is differentiated from existing facilities in the ISA, and thereby meets a criterion for approval of its application under HCPF's regulation at § 8.430.3.A.5.b. Third, after reviewing the population data and the regulation, I have concluded that the proposal meets the regulation's "underserved geographic area" definition found at § 8.430.5.j.i, which is another criterion that supports the application as submitted.

In particular, it is my opinion that the regulation's "need formula" can only reasonably be interpreted as relating to the number of beds available to Medicaid patients and, therefore, in order to conduct an appropriate analysis, I have considered only Medicaid certified beds in service when applying that formula. I am also of the opinion that, for health planning purposes, any assessment that was limited to the 75+ population category would be remarkably flawed and incomplete given that the 65+ population already resides in nursing facilities and, as this population ages, it must be accounted for given the span of time necessary to complete this project and for it to reach its optimal capacity. Thus, in legitimately applying the "need formula," I find it necessary to consider both the 65+ and 75+ population groups and the Medicaid certified beds in service. Accordingly, I have concluded that the MCHS-Lakewood proposal's request for 60 Medicaid certified beds meets the "need formula."

Additionally, for purposes of the underserved geographic area requirements, I have demonstrated that, regardless of whether "county" refers to geographic area or its population, the project's ISA meets the requirement that a service area be "no more than two contiguous counties." Moreover, I am of the opinion that there is a significant need for 60 Medicaid certified beds within the ISA, even considering that CDPHE's census bed reports measure

occupancy rate for the total number of licensed beds, and not just for Medicaid certified beds, because the MCHS-Lakewood project will have the only newer certified beds for Medicaid recipients. Accordingly, for these reasons, I conclude that the MCHS-Lakewood project meets the requirements under the underserved geographic area.

Dated this 4 day of April 2014.

Bruce R. Neumann, PhD

EXHIBIT A

COMPARISON OF 65+, 75+ and TOTAL POPULATION - YEARS 2012 and 2017

COLORADO DEPARTMENT OF LOCAL AFFAIRS and PITNEY BOWES ANYSITE DATA

Colorado State Data				Pitney Bowes Data				DIFFERENCE AMOUNT (amt DLA larger than PB)		DIFFERENCE FACTOR
Area	Age Group	Pop. Year	Total No.	Area	Age Group	Pop. Year	Total No.	Pop. Year	Difference Number	Factor by Which DLA is larger than PB #
Arapahoe	65 +	2012	64,911	Arapahoe	65 +	2012	59,215	2012	5,696	1.0962
Arapahoe	65 +	2017	84,800	Arapahoe	65 +	2017	71,780	2017	13,020	1.1814
Denver	65 +	2012	68,047	Denver	65 +	2012	63,949	2012	4,098	1.0641
Denver	65 +	2017	81,947	Denver	65 +	2017	75,508	2017	6,439	1.0853
Jefferson	65 +	2012	75,124	Jefferson	65 +	2012	68,003	2012	7,121	1.1047
Jefferson	65 +	2017	95,657	Jefferson	65 +	2017	78,797	2017	16,860	1.2140
TOT STATE:	65 +	2012	612,509	TOT STATE:	65 +	2012	561,647	2012	50,862	1.0906
TOT STATE:	65 +	2017	780,504	TOT STATE:	65 +	2017	676,309	2017	104,195	1.1541
Arapahoe	75 +	2012	26,860	Arapahoe	75 +	2012	26,130	2012	730	1.0279
Arapahoe	75 +	2017	31,786	Arapahoe	75 +	2017	29,476	2017	2,310	1.0784
Denver	75 +	2012	30,470	Denver	75 +	2012	30,835	2012	-365	0.9882
Denver	75 +	2017	32,379	Denver	75 +	2017	34,054	2017	-1,675	0.9508
Jefferson	75 +	2012	31,583	Jefferson	75 +	2012	30,058	2012	1,525	1.0507
Jefferson	75 +	2017	37,045	Jefferson	75 +	2017	32,479	2017	4,566	1.1406
TOT STATE:	75 +	2012	254,300	TOT STATE:	75 +	2012	244,483	2012	9,817	1.0402
TOT STATE:	75 +	2017	301,519	TOT STATE:	75 +	2017	274,230	2017	27,289	1.0995
Arapahoe	Total Pop	2012	593,589	Arapahoe	Total Pop	2012	592,031	2012	1,558	1.0026
Arapahoe	Total Pop	2017	638,367	Arapahoe	Total Pop	2017	617,841	2017	20,526	1.0332
Denver	Total Pop	2012	628,174	Denver	Total Pop	2012	623,738	2012	4,436	1.0071
Denver	Total Pop	2017	665,658	Denver	Total Pop	2017	637,474	2017	28,184	1.0442
Jefferson	Total Pop	2012	542,958	Jefferson	Total Pop	2012	540,597	2012	2,361	1.0044
Jefferson	Total Pop	2017	560,449	Jefferson	Total Pop	2017	543,408	2017	17,041	1.0314
TOT STATE:	Total Pop	2012	5,189,245	TOT STATE:	Total Pop	2012	5,173,970	2012	15,275	1.0030
TOT STATE:	Total Pop	2017	5,621,665	TOT STATE:	Total Pop	2017	5,384,753	2017	236,912	1.0440

SOURCE: Colorado Department of Local Affairs, population data for selected counties, age groups 65+ and 75+, years 2012-2017;
Total population from Table III - C - 1.

Pitney Bowes AnySite Data, population estimates and projections for selected age groups, 2012 - 2017.

EXHIBIT B

COMPARISON OF 65+, 75+ and TOTAL POPULATION DATA - YEARS 2013 and 2018

COLORADO DEPARTMENT OF LOCAL AFFAIRS and PITNEY BOWES ANYSITE DATA

Colorado State Data				Pitney Bowes Data				DIFFERENCE AMOUNT (amt DLA larger than PB)		DIFFERENCE FACTOR
Area	Age Group	Pop. Year	Total No.	Area	Age Group	Pop. Year	Total No.	Pop. Year	Difference Number	Factor by Which DLA is larger than PB #
Arapahoe	65 +	2013	68,928	Arapahoe	65 +	2013	61,143	2013	7,785	1.1273
Arapahoe	65 +	2018	89,185	Arapahoe	65 +	2018	75,080	2018	14,105	1.1879
Denver	65 +	2013	70,760	Denver	65 +	2013	65,436	2013	5,324	1.0814
Denver	65 +	2018	84,826	Denver	65 +	2018	81,002	2018	3,824	1.0472
Jefferson	65 +	2013	79,097	Jefferson	65 +	2013	70,409	2013	8,688	1.1234
Jefferson	65 +	2018	100,234	Jefferson	65 +	2018	83,542	2018	16,692	1.1998
TOT STATE:	65 +	2013	645,735	TOT STATE:	65 +	2013	581,814	2013	63,921	1.1099
TOT STATE:	65 +	2018	817,178	TOT STATE:	65 +	2018	700,617	2018	116,561	1.1664
Arapahoe	75 +	2013	27,567	Arapahoe	75 +	2013	26,399	2013	1,168	1.0442
Arapahoe	75 +	2018	33,346	Arapahoe	75 +	2018	30,802	2018	2,544	1.0826
Denver	75 +	2013	30,628	Denver	75 +	2013	30,875	2013	-247	0.9920
Denver	75 +	2018	33,352	Denver	75 +	2018	36,437	2018	-3,085	0.9153
Jefferson	75 +	2013	32,442	Jefferson	75 +	2013	30,420	2013	2,022	1.0665
Jefferson	75 +	2018	38,803	Jefferson	75 +	2018	34,498	2018	4,305	1.1248
TOT STATE:	75 +	2013	260,074	TOT STATE:	75 +	2013	247,527	2013	12,547	1.0507
TOT STATE:	75 +	2018	316,571	TOT STATE:	75 +	2018	284,315	2018	32,256	1.1135
Arapahoe	Total Pop	2013	602,868	Arapahoe	Total Pop	2013	595,921	2013	6,947	1.0117
Arapahoe	Total Pop	2018	647,563	Arapahoe	Total Pop	2018	639,769	2018	7,794	1.0122
Denver	Total Pop	2013	636,234	Denver	Total Pop	2013	622,695	2013	13,539	1.0217
Denver	Total Pop	2018	673,313	Denver	Total Pop	2018	678,951	2018	-5,638	0.9917
Jefferson	Total Pop	2013	545,799	Jefferson	Total Pop	2013	544,658	2013	1,141	1.0021
Jefferson	Total Pop	2018	565,225	Jefferson	Total Pop	2018	567,607	2018	-2,382	0.9958
TOT STATE:	Total Pop	2013	5,267,800	TOT STATE:	Total Pop	2013	5,216,830	2013	50,970	1.0098
TOT STATE:	Total Pop	2018	5,718,164	TOT STATE:	Total Pop	2018	5,534,516	2018	183,648	1.0332

SOURCE: Colorado Department of Local Affairs, population data for selected counties, age groups 65+ and 75+, years 2013-2018;
Total population from Table III - C - 1.

Pitney Bowes AnySite Data, population estimates and projections for selected age groups, 2013 - 2018.

EXHIBIT C

SUMMARY OF ISA BED NEED BASED ON 40 BEDS / 1,000 POPULATION AND DIFFERENT BED INVENTORY SCENARIOS

					Bed Need Adjusted for Increase Factors*			
Population Estimates/Projections:	2012	2013	2017	2018	2012	2013	2017	2018
Population 65+	42,408	43,762	49,695	52,478	48,769	50,326	57,149	60,350
Population 75+	19,000	19,213	20,839	22,124	19,950	20,174	21,881	23,230
Age-Specific Bed Need Based on 40 beds/1,000 pop:								
Bed Need for 65+ pop	1,696	1,750	1,988	2,099	1,951	2,013	2,286	2,414
Bed Need for 75+ pop	760	769	834	885	798	807	875	929
Existing Bed Inventory (2013) Options in Service Area:								
Total Licensed Nursing Facility Beds	1,177	1,177	1,177	1,177	1,177	1,177	1,177	1,177
Beds Licensed at Medicaid-Certified Nursing Facilities	965	965	965	965	965	965	965	965
Total Beds In Service	1,007	1,007	1,007	1,007	1,007	1,007	1,007	1,007
Beds In Service at Medicaid-Certified Nursing Facilities	795	795	795	795	795	795	795	795
Additional Bed Need Based on Total Licensed Beds:								
Additional Need for 65+ population	-519	-573	-811	-922	-774	-836	-1,109	-1,237
Additional Need for 75+ population	417	408	343	292	379	370	302	248
Additioinal Bed Need Based on Licensed Beds at Medicaid-Certified Nursing Facilities:								
Additional Need for 65+ population	-731	-785	-1,023	-1,134	-986	-1,048	-1,321	-1,449
Additional Need for 75+ population	205	196	131	80	167	158	90	36
Additional Bed Need Based on Total Beds In Service:								
Additional Need for 65+ population	-689	-743	-981	-1,092	-944	-1,006	-1,279	-1,407
Additional Need for 75+ population	247	238	173	122	209	200	132	78
Additional Bed Need Based on Beds In Service at Medicaid-Certified Nursing Facilities:								
Additional Need for 65+ population	-901	-955	-1,193	-1,304	-1,156	-1,218	-1,491	-1,619
Additional Need for 75+ population	35	26	-39	-90	-3	-12	-80	-134

*** NOTE:** Increase Factors are 1.05 for population 65+ and 1.5 for population 75+, to adjust for the Colorado Department of Local Affairs population estimates/projectionswhich exceed the Pitney Bowes AnySite population estimates/projections.

Additional Bed Need indicated by negative numbers.

SOURCE: Licensed Beds - Colorado Department of Health Care Policty and Financing, from Quarterly Census Report, for period end 9/30/2013.
Population estimates/projections - Pitney Bowes AnySite Data, for years 2012, 2013, 2017, 2018.

EX T D

NURSING HOMES LOCATED IN IDENTIFIED SERVICE AREA (ISA) - HCPF LICENSED BEDS

Id	Name	City	Zip	Beds Total	Total Residents	Medicare	Medicaid	Other	Organization Name	County Name	Particip. Date (opening Date)
1	PARKVIEW CARE CENTER	DENVER	80219	77	70	7	58	5		DENVER	1992 (1951)
2	NORTH STAR REHABILITATION AND CARE COMMUNITY	DENVER	80219	85	79	10	65	4	PONDEOSA CARE COMMUNITIES	DENVER	1990 (1969)
3	AUTUMN HEIGHTS HEALTH CARE CENTER	DENVER	80236	125	108	12	88	8	THE WAVERLY GROUP, INC.	DENVER	1984 (1959)
4	BETHANY REHABILITATION CENTER	LAKEWOOD	80226	170	139	7	116	16	Sage Health Services of Indiana	JEFFERSON	1989 (1960)
5	MAPLETON CARE CENTER	LAKEWOOD	80226	90	73	5	52	16		JEFFERSON	1968
6	HALLMARK NURSING CENTER	DENVER	80236	143	111	14	46	51	PUEBLO MEDICAL INVESTORS LLC	DENVER	1986
7	VILLA MANOR CARE CENTER	LAKEWOOD	80226	240	84	17	53	14	LIFE CARE CENTERS OF AMERICA	JEFFERSON	1971(1951)
8	LITTLETON CARE AND REHABILITATION CENTER	LITTLETON	80123	35	29	19	8	2	Ensign Group	ARAPAHOE	1994 (1954)
9	POWERBACK REHABILITATION (prev Azura of Lakewood)	LAKEWOOD	80227	108	107	87	0	20		DENVER	2010
10	EMERITUS AT GREEN MOUNTAIN LONG TERM CARE	LAKEWOOD	80228	45	40	11	0	29	EMERITUS SR LIVING	JEFFERSON	1999
11	LAKEWOOD MERIDIAN (not Mediaid or Medicare certified)	LAKEWOOD	80232	59	45	0	0	45	Brookdale Senior Living	JEFFERSON	-1985
	TOTAL (all SNFs):			1,177	885 75.19%	189 21.36%	486 54.92%	210 23.73%			
	TOTAL (Medicaid-Certified SNFs only):			965	693 71.81%	91 13.13%	486 70.13%	116 16.74%			

NURSING HOMES LOCATED IN IDENTIFIED SERVICE AREA (ISA) - BEDS IN SERVICE

Id	Name	City	Zip	Beds In Service	Total Residents	Medicare	Medicaid	Other	Organization Name	County Name	Particip. Date (opening Date)
1	PARKVIEW CARE CENTER	DENVER	80219	73	70	7	58	5		DENVER	1992 (1951)
2	NORTH STAR REHABILITATION AND CARE COMMUNITY	DENVER	80219	85	79	10	65	4	PONDEOSA CARE COMMUNITIES	DENVER	1990 (1969)
3	AUTUMN HEIGHTS HEALTH CARE CENTER	DENVER	80236	125	108	12	88	8	THE WAVERLY GROUP, INC.	DENVER	1984 (1959)
4	BETHANY REHABILITATION CENTER	LAKEWOOD	80226	170	139	7	116	16	Sage Health Services of Indiana	JEFFERSON	1989 (1960)
5	MAPLETON CARE CENTER	LAKEWOOD	80226	75	73	5	52	16		JEFFERSON	1968
6	HALLMARK NURSING CENTER	DENVER	80236	130	111	14	46	51	PUEBLO MEDICAL INVESTORS LLC	DENVER	1986
7	VILLA MANOR CARE CENTER	LAKEWOOD	80226	102	84	17	53	14	LIFE CARE CENTERS OF AMERICA	JEFFERSON	1971 (1951)
8	LITTLETON CARE AND REHABILITATION CENTER	LITTLETON	80123	35	29	19	8	2	Ensign Group	ARAPAHOE	1994 (1954)
9	POWERBACK REHABILITATION (prev Azura of Lakewood)	LAKEWOOD	80227	108	107	87	0	20		DENVER	2010
10	EMERITUS AT GREEN MOUNTAIN LONG TERM CARE	LAKEWOOD	80228	45	40	11	0	29	EMERITUS SR LIVING	JEFFERSON	1999
11	LAKEWOOD MERIDIAN (not Mediaid or Medicare certified)	LAKEWOOD	80232	59	45	0	0	45	Brookdale Senior Living	JEFFERSON	-1985
	TOTAL (all SNFs):			1,007	885 87.88%	189 21.36%	486 54.92%	210 23.73%			
	TOTAL (Medicaid-Certified SNFs only):			795	693 87.17%	91 13.13%	486 70.13%	116 16.74%			

= Nursing Homes that are not Medicaid Certified.

Age of Nursing Facilities: Participation Date is date listed by CMS for most current owner; (year) = Age of SNF per phone survey/visit.

SOURCE: Colorado Health Care Policy and Financing census from Quarterly Census Report 9/30/13.

Operating Beds from market visits/tours 2/2013 and phone surveys 10/2013 and 11/2013.

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DEGREES

Ph.D., Department of Accountancy, University of Illinois, 1975.

Master of Science in Accounting, Graduate School of Business, University of Minnesota, 1967.

Bachelor of Science in Business with High Distinction, School of Business Administration, University of Minnesota, 1965.

FACULTY APPOINTMENTS

UNIVERSITY OF COLORADO DENVER, Business School, Denver, Colorado
Associate Dean, 2009, PricewaterhouseCoopers Term Professor, 2004-07, Professor of Accounting and Health Care Financial Management, 1985-present, Associate Professor of Accounting, 1984-85.

UNIVERSITY OF COLORADO, School of Business & Administration, Boulder, Colorado
Associate Professor of Accounting (with tenure), 1979-84. Assistant Professor of Accounting, 1975-79.
Joint appointment at Health Sciences Center, 1980-82.

STATE UNIVERSITY OF NEW YORK, Business School, Albany, NY 1980-81 (tenure 5/81).
(Earlier professional appointments omitted.)

VISITING FACULTY APPOINTMENTS

IAE Business School, University of Aix-Marseilles III, Aix en Provence, France
Visiting Professor of Accounting, April 2011, February-May 2012, April 2013, April 2014.

EDHEC Business School, Nice, France
Visiting Professor of Accounting, Nov. 2004, April 2005, Oct. 2005, May 2006.

JAMES COOK UNIVERSITY, Townsville Queensland, Australia,
Teaching Fellow, School of Public Health and Tropical Medicine, July, 1999.

MURDOCH UNIVERSITY, Perth, Western Australia
Visiting Fellow, 1998.

UNIVERSITY OF AUCKLAND, New Zealand
Visiting Professor of Accounting & Health Management, 1995.

BOND UNIVERSITY, Gold Coast, Queensland, Australia
Visiting Professor of Accounting, 1990-91.

UNIVERSITY OF MANCHESTER, Manchester, England
Coopers & Lybrand Fellow, Health Services Management Unit, 1989.

HONORS, AWARDS, and APPOINTMENTS

Beta Alpha Psi, University of Minnesota, 1963-65. (Chapter President, 1964-65.)
Beta Gamma Sigma, University of Minnesota, Chapter President, 1964-65.
PricewaterhouseCoopers Term Professor of Accounting, Business School, UC Denver, 2004-07.
IMA Research Foundation (IRF), Board Member, Institute of Management Accountants (IMA), 2007-present, Chair, Academic Committee (2010-present).
University of Colorado Outstanding Service Award, UC Denver, 2007.
Outstanding Faculty Service Award, Business School, UC Denver, 2006 and 1989.
Distinguished Accounting Faculty, Beta Alpha Psi, UC Denver, 1995.
University of Colorado Faculty Fellowship, CU Boulder, 1982-83.
Colorado Health Data Commission, appointed Commissioner by Governor Roy Romer, 1992-95.
Colorado Commission on Management and Efficiency, Department of Institutions, appointed as Commissioner by Governor Richard Lamm, 1981-82.
Research Fellow, Gerontological Society of America, 1982.
Erskine Fellowship, University of Canterbury, Christ Church, New Zealand, 1997.
Faculty Fellow, White Memorial Hospital, Los Angeles, 1997.
Twenty sponsored research grants ranging from $4,000 to $1,400,000.

INFLUENTIAL LEADERSHIP & SERVICE EXPERIENCES

1. Accounting Programs, Director, UC Denver, 1984-88, 1992-97, and 2000-08
Responsible for course scheduling, academic advising, faculty recruiting, curriculum development, revising graduate curricula, and graduate student admissions and retention.
Accomplishments during second term include recruiting five faculty members securing initial AACSB accounting accreditation, revising under-graduate curricula, and establishing an Accounting Advisory Board. During this period only two other Colorado schools achieved AACSB accounting accreditation. The accounting faculty was *ranked first in the U.S.* (tied with Dartmouth College) in terms of faculty research productivity among non-doctoral programs. On a size-adjusted, weighted basis, our program was *ranked fifth in the U.S.* among all accounting programs.

2. Faculty Council, Member, 1996-2002, 2004-08, 2010-present (Secretary, 2005-08, 2010-11).
Engaged in faculty governance activities for all CU campuses. Served on Educational Policy and University Standards Committee (EPUS), 1997-2004. Helped design new student course evaluation protocols. Helped create new revenue distribution models for intellectual property. Chair of Budget Committee 2005-08, 2010-present.

3. University Benefits Advisory Board (UBAB), 1999-2013), (Chair 1999-2002, 2012-2013).
Helped design and implement multi-campus advisory board for faculty and staff co-management of benefits programs on all four CU campuses. Designed and implemented quarterly benefits newsletter. Helped implement new health plans, select benefits director, select benefits consultants, and negotiate annual rates and revisions

for all CU health plans and similar benefit plans (dental, life, etc.).

4. Graduate Programs in Health Administration, Director, UC Denver, 1986-88.
Responsible for staff supervision, course scheduling, academic advising, curriculum development, faculty mentoring, external relations, and program accreditation. Accomplishments include highest per capita telethon gifts at CU-Denver, revision of graduate curricula, 100% increases in graduate enrollments, successful program re-accreditation, and program grants of approximately $100,000 per year.

5. Executive Program in Health Administration, Program Director, UC Denver, 1985-88.
Responsible for staff supervision, curriculum design and revision, faculty recruiting, evaluation and training, external relations, grant reporting, technical support, student services, educational technology and assessment, budgeting and fiscal management, software review, grant management and consortium activities. Co-principal investigator on four year grant of $1,400,000 to University of Colorado and Western Network for Education in Health Administration to design and implement a *unique distance education and consortium-based graduate degree*. Accomplishments include successful program design and implementation, matriculation of four classes (averaging over 30 students each) with retention rates exceeding 90%. Established program self sufficiency. Primary accomplishment was demonstrating the efficacy of computer-mediated conferencing for graduate instruction in an innovative, and previously untested, format.

6. Faculty Assembly, Secretary & Vice-Chair, 1987-89, Member, 1995-98, Fall 2007-present.
Served on Executive Committee, reviewed faculty questionnaire and results concerning administrative leadership, attended two strategic planning retreats (helped arrange one), prepared several bylaw revisions, and improved co-governance and recognition of faculty views.

BOOKS

Using Financial Accounting: The Smart Guide to Analyzing Financial Statements, co-author with E. Conner, 3-volume set including Application Suite and CD-ROM, Kendall/Hunt Publishing Company, Dubuque, Iowa, 2004 and 2007.

Financial Management: Concepts and Applications for Health Care Organizations, co-author with J. Clements & J. Cooper, Kendall/Hunt Publishing Company, Dubuque, Iowa, 1997, 1999, & 2002. (Earlier editions with J. Suver and W. Zelman, National Health Publishing, Towson, Maryland, 1984, 1988, and 1993).

Using Financial Accounting: An Introduction, co-author with D. Murray & P. Elgers, Southwestern College Publishing (ITP), Cincinnati, Ohio, 1997, and 2000.

Management Accounting for Health Care Organizations, co-author with K. Boles, Healthcare Financial Management Association & Pluribus Press, Chicago, 1981, 1985, 1992 and 1998 (1981-1992, with J. Suver).

Accounting for Managers & Investors, co-author with M. Granof & P. Bell, Prentice Hall, Englewood Cliffs, New Jersey, 1992. (Seven book chapters and two monographs omitted.)

REFERRED ARTICLES (ACADEMIC JOURNALS)

"Management Control Systems and Corporate Social Responsibility (CSR): Information Overload Constraints," *Cost Management* (Journal), forthcoming, 2013.

"Management Control Systems Dilemma: Reconciling Sustainability with Information Overload" *Advances in Management Accounting,* Vol. 20, 2012.

"A Forensic Audit of Staffing and Census in a Long-Term Care Facility," co-author with M. Crowdes and D. Neumann, *Journal of Forensic & Investigative Accounting*, Volume 2:No. 1, January-June, 2010. http://www.bus.lsu.edu/accounting/faculty/lcrumbley/jfia/Articles/v2n1.htm, .

"Unmet Public Expectations, Pay IT Now or Pay IT Later: Lessons Learned from the Colorado Benefits Management System (CBMS), *International Journal of Public Information Systems*, forthcoming, 2010.

"Evaluation de la performance des managers: l'effet de l'ordre de Presentation et de l'importance relative des indicateurs financiers et non financiers," (Effects of Primacy and Importance of Financial/Nonfinancial Performance Measures on Manager's Performance Evaluations), *Comptabilité-Contrôle-Audit* (Accounting, Control, Audit journal), co-author with E. Cauvin and M. Roberts, September, 2010, pp. 31-47.

"Modeling Weekend Effects and Reporting Errors: Performance Measurement in LTC," co-author with M. Crowdes and D. Neumann, *Cost Management* (journal), March/April, 2009.

"Financial and Nonfinancial Performance Measures: Influences on How Managers are Evaluated," co-author with M. Roberts and E. Cauvin, *Cost Management* (journal), Nov/Dec. 2008, pp. 5-13.

"French Cost Accounting Methods: ABC and other Structural Similarities", co-author with E. Cauvin, May/June, 2007, *Cost Management* (journal), Vol. 21, #3, pp. 35-41.

"Cost Management using ABC for IT activities and Services," co-author with J. Gerlach, E. Moldauer, M. Finch, and C. Olson, *Management Accounting*, Fall, 2004.

"Determining the Cost of IT Services," co-author with J. Gerlach, M. Argo, D. Frisby, and E. Moldauer. *Communications of the ACM* (CACM), Association for Computing Machinery, Vol. 45, No. 9, September, 2002, pp. 61-67.

"Industry-university "consulternships" an implementation guide," co-author with S. Banghart, *The International Journal of Educational Management*, Volume 15, Number 1, 2001. pp. 7-11.

"Prospective Payment Systems: Evaluation and Implementation." *Residential Treatment for Children and Youth*, Haworth Press. Vol. 17, Number 4, 2000, pp. 32-34.

"Structure and Advantages of Distributed Educational Model for Health Care Managers," *Journal of Health Administration Education*, Fall, 1989, pp. 711-722.

"Use of Cost Prediction Simulation Models for CON Affordability Review," co-author with J. Kim, *Health Care Management Review,* Winter, 1985, pp- 75-82.

"Management Accounting Research in Government Organizations," *Research in Government Accounting, Reporting, Budgeting and Auditing: Evaluation and Issues for Research,* American Accounting Association, Sarasota, June, 1982, pp. 102-118. This article was reprinted in *Public Sector Accounting: A Book of Readings*, Irwin, 1984.

Managing Rate Adjustments by Health Care Providers," co-author with J. Suver and W. Zelman, *Health Services Research,* Summer, 1983, pp. 165-179.

"A Further Guide to Research on the Economic Consequences of Accounting Information," co-author with F. Selto, *Accounting and Business Research,* Autumn, 1981, pp. 317-322.

"Should Financial Statements Disclose the Cost of Replacing Hospital Assets?" co-author with L. Friedman, *Health Care Management Review*, Winter, 1980, pp. 49-58.

"The Effects of Opportunity Costs on Project Investment Decisions: Replication and Extensions," co-author with L. Friedman, *Journal of Accounting Research,* Autumn, 1980, pp. 407-419.

"A Computer Simulation Model of Hospital Mergers," co-author with L. Friedman, F. Selto, and J. Suver, *Health Care Management Review,* Summer, 1980, pp. 53-65.

"On the Use of Hospital Classification Models," *Inquiry,* Winter, 1979, pp. 356-362.

"An Empirical Investigation of the Relationship between an AID Hospital Classification Model and Accounting Measures of Performance," *Journal of Accounting Research,* Spring, 1979, pp. 123-139.

"Opportunity Costs: Further Evidence through an Experimental Replication," co-author with L. Friedman, *Journal of Accounting Research*, Autumn, 1978, pp. 400-410.

"Consolidation of Community Hospitals," co-author with D. Bloomfield and M. Harms, *Journal of Community Health,* Volume 4, No. 1, Fall, 1978, pp. 73-81.

"New Patches on Old Wineskins," Studies on Measurement and Evaluation of The Efficiency of Public and Private Nonprofit Institutions, *Journal of Accounting Research,* Volume 15, 1977, pp. 225-235.

"Hospital Productivity: An Evaluation of Proposed Measurement Models," *Public Productivity Review,* July, 76, pp. 23-36.

"A Financial Analysis of a Hospital Merger," *Medical Care,* December 1974, pp. 983-998. This article was reprinted in *Financial Management of Health Care Facilities*, Aspen, Germantown, Maryland, 1976, pp. 318-333.

REFEREED ARTICLES (PROFESSIONAL JOURNALS)

"Streamlining Budgeting in the New Millennium." *Strategic Finance,* December, 2001, pp. 45-49.

"Health Benefits Survey: Analysis and Implications," co-author with C. Bannister, *Benefits/Links*, accepted, publication date unknown.

"Budgeting: The Problem with Incentives," *National Accountant*, February, 2000.

"Budgeting & Gamesmanship: The Uses and Abuses of Operational Budgeting Processes," *National Accountant*, December, 1999. p. 11-13

"Accounting for the Costs of Quality," co-author with J. Suver & K. Boles, *Healthcare Financial Management.* Sept. 1992, pp. 29-33.

"Total Quality Management," *The Retirement Industry Journal,* Feb. 1992, pp. 51-53.

"Capital Questions," *Health Service Journal,* March 8, 1990, pp. 358-361.

"Professionals Earn Masters and Maintain Careers at Same Time," co-author with R. Foster and D. Smith, *Health Progress,* May 1988, pp. 48-50.

"Variance Analysis, KANBAN and JIT: A Further Study," co-author with P. Jaouen, *Journal of Accountancy,* June, 1987, pp. 164-173.

"Resource Measurement of Health Care Providers," co-author with J. Suver, *Hospital and Health Services Administration,* Sept/Oct 1986, pp. 44-52.

"KANBAN, ZIPS and Cost Accounting" co-author with P. Jaouen, *Journal of Accountancy,* August, 1986, pp. 132-141.

"Cost Effectiveness Issues and Research Studies," *Journal of Long-Term Care Administration,* Fall, 1983, pp. 48-53.

Fourteen earlier articles omitted for the sake of brevity.

SOFTWARE DEVELOPMENT

Computer-assisted instructional modules (5), health care financial management.